

--	--	--	--	--	--	--	--	--	--

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2022/2023

PEM0044 – ESSENTIAL MATHEMATICS
(All Sections/Groups)

04 OCTOBER 2023
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of **THREE (3) pages** excluding cover page with **4 Questions** only.
2. Answer all **FOUR (4)** questions.
3. Only NON-PROGRAMMABLE calculators are allowed.

Question 1 (25 Marks)

a) Solve each of the following equation:

i. $\frac{x+7}{3} - \frac{5x-2}{4} = 10$ (6 marks)

ii. $|4x - 9| = 5$ (4 marks)

iii. $x^2 + 7x - 5 = 0$; by using quadratic formula. (4 marks)

b) Simplify the expression and express the answer so that all exponents are positive.

$$(2x^{-2}y^4z)^{-2}(x^2yz^3)^3$$
 (6 marks)

c) Solve the following inequality.

$$-1 \leq 3x - 8 \leq 7$$
 (5 marks)

Question 2 (25 Marks)

a) Find the equation of a straight line containing points (3,6) and (-2, -4). Graph the line. (7 marks)

b) Find an equation of straight line that passes through point (5, -3) and is perpendicular to the line $6y + 2x - 1 = 0$. (6 marks)

c) Graph the transformation of the following function by starting with basic function.

$$f(x) = (x + 3)^2 - 2$$
 (6 marks)

d) Find the sum of the terms in the following arithmetic progression:

$$2, -3, -8, \dots, -38$$
 (6 marks)

Continued...

Question 3 (25 Marks)

a) Let $A = \begin{bmatrix} -1 & 6 \\ 4 & 3 \\ 2 & -9 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -6 \\ 0 & 3 \\ -5 & 1 \end{bmatrix}$,

Find $5A - 3B$

(5 marks)

b) Given $P = \begin{bmatrix} 1 & 3 \\ -2 & 2 \\ 4 & 1 \end{bmatrix}$, $Q = \begin{bmatrix} 2 & 1 & 4 \\ -2 & 5 & -1 \\ 0 & 2 & -3 \end{bmatrix}$, find

i. P^T

(2 marks)

ii. $P^T Q$

(4 marks)

c) Given that

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 0 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

Find matrix of:

i. minor (A)

(5 marks)

ii. cofactor (A)

(2 marks)

iii. adjoint (A)

(2 marks)

iv. determinant, $|A|$

(2 marks)

v. inverse, A^{-1}

(3 marks)

Question 4 (25 Marks)

a) Differentiate each of the following function:

i. $f(x) = 9x^{-2} - 2x^{-1} - \frac{x}{5}$

(3 marks)

ii. $f(x) = (2x^4 - 3x^2 + 5)^{10}$

(3 marks)

iii. $f(x) = \frac{x}{1-5x}$

(5 marks)

b) Integrate the following integrals:

i. $\int x^3 - 3x^2 + 7x - 10 dx$

(4 marks)

ii. $\int 3x(5 + x^2)^{-\frac{1}{2}} dx$

(5 marks)

c) Evaluate $\int_{-1}^1 (9x^2 + 2x - 1) dx$

(5 marks)

End of Question.

Course: Essential Mathematics

Code: PEM0044

Summary of Formulas

Basic Rules of Differentiation

- (i) $f'(c) = 0$
- (ii) $f'(x) = nx^{n-1}$
- (iii) $cf(x): cf'(x)$
- (iv) $f(x) \pm g(x): f'(x) \pm g'(x)$
- (v) Product rule, $f(x) = u \cdot v: f'(x) = uv' + vu'$
- (vi) Quotient rule, $f(x) = \frac{u}{v}; f'(x) = \frac{vu' - uv'}{v^2}$
- (vii) Chain rule: $\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$
- (viii) General power rule: Derive $[f(x)]^n = n[f(x)]^{n-1} f'(x)$

Basic Rules of Integration

- (i) $\int k \, dx = kx + C$
- (ii) $\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$
- (iii) $\int kf(x) \, dx = k \int f(x) \, dx$
- (iv) $\int (f \pm g)(x) = \int f(x) \, dx \pm \int g(x) \, dx$

End of Page.